Notes on the Abundance of the Spiders Latrodectus mactans, L. geometricus and Argiope avara, and of their Parasites on the Island of Hawaii

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Latrodectus mactans (Fabr.) and L. geometricus Koch

In June or July of 1939 reports reached entomologists of the Experiment Station, H.S.P.A. of an unusually heavy infestation of *L.mactans* at Morse Field, South Point, Hawaii. With the double object of verifying the reports and of liberating a large colony of *Baeus californicus* Pierce, the then recently introduced egg parasite of the spider, I visited Morse Field on August 22, 1939, and found that actual conditions had not been overstated in the reports. Spiders were in fact excessively abundant in the vicinity of the barracks, and at least one individual, usually more, could be found under every stone that was turned over, and within almost every clump of grass thick enough to provide a modicum of protection. The barracks themselves were festooned, inside and out, with numerous webs, and it was not difficult to understand that their annoyance to the troops had long become more than merely psychological. In short, South Point showed during August 1939 the thickest infestation of *L. mactans* that I have ever seen or read of, and provided an ideal site for the liberation of the parasites I had with me.

The liberation was made. The parasites were spread out over an area of about half an acre in the vicinity of what were then the modest barracks of a small garrison. For one reason or another, mostly on account of the relative inaccessibility of South Point, no further observation was made again until June 23, 1944.

On that date I again visited South Point and found greatly changed conditions. As it turns out, however, they are not the entirely satisfactory conditions nor the exact changes that I expected. While the population of *L. mactans* has been greatly reduced so that spiders and webs of this species can be found only with difficulty, *Latrodectus geometricus,* a closely related species not heretofore seen at South Point, has appeared upon the scene, and now completely fills the niche formerly occupied by *mactans. L. mactans* can still be found, a scattered spider and a few egg masses here and there under a stone or plank, but not a single spider nor an egg mass of the species is to be seen in any of the many buildings which now constitute the greatly expanded barracks. All the numerous spiders which at present enjoy the protection of Uncle Sam's roofs are of the species *geometricus.*

Following the liberation of a parasite (*Baeus*) which is known to attack the eggs of *L. mactans* only, this strikingly complete supersession of one species by the other naturally suggests great efficiency on the part of the parasite; but unfortunately, other circumstances of the case contradict this suggestion. In the first place, neither *Baeus* itself nor any evidence of its presence—other than the circumstantial evidence provided by the observed reduction of *L. mactans*—have been found in the South Point area. In the second place, even if the parasite were definitely known to be established in the area, it would not necessarily follow that its work had caused the suppression of *mactans* by *geometricus*. The same result might obtain from a different cause, i.e.: better adaptation of *geometricus* to the local environment. This, in fact, I believe to be the real cause. Assumption that it is the real cause agrees with previous observations—all of a more cursory nature than the present one—which have been made from time to time by myself and my colleagues on the relative survival potential of the two species concerned. And it agrees also with the fact that *L. geometricus* was not found in South Point at the time of my first visit in 1939. The species, I believe, had not found its way into the area at that time. When it later did so, some time between 1939 and 1944, it easily displaced *L. mactans,* and would have done so regardless of the presence or absence of *Baeus.*

Argiope avara Thorrel

Up to some 14 or 15 years ago *Argiope avara* was one of the most common and conspicuous invertebrates of our fields. In cane fields particularly, where the strong webs sometimes made uncomfortable the transit of men and animals, the spider was not an unmixed blessing. Then, following the establishment early in the last decade of *Tromatobia rufopectus* (Cresson), a self-introduced hymenopterous parasite, the spider practically disappeared until some four or five years ago, since when an upward trend in the population has again become evident.

It has been surmised that this reversal in population trend was due to the work of a hyperparasite of *Tromatobia.* But although the hyperparasite itself, a spalangid, *Pleurotropis wilderi* (Howard), has been known a long time and has been reported more than once in circumstances that clearly indicated the nature of its role, no direct evidence has been turned up heretofore on the actual importance of that role.

It is this evidence which I luckily ran into on June 29 of the current year, in one of the thickets of cactus plants which are to be found on the slopes immediately north of the town of Kamuela, Hawaii. It consisted, first, of hundreds of webs and egg cases of *Argiope avara,* a concentration greater than I had ever seen before, even previous to the establishment of *Tromatobia;* second, of the

corroborative evidence provided by the dissection of a representative lot selected from the great number of egg masses available. The large number of egg masses shows a very definite reduction in the efficiency of *Tromatobia rufopectus,* the primary parasite of the spider. The results of dissecting the representative lot of egg masses indicates that the reduced efficiency of *Tromatobia* must be due to the work of the hyperparasite.

The quantitative results of the dissections follow:

Total number of egg masses examined	55
Egg masses in which hyperparasites had developed or into which adults had crawled	55
Egg masses in which all primaries had been destroyed by the hyperparasite	46
Egg masses in which the hyperparasites had destroyed all but one or two of the primaries	5
Egg masses in which no primaries had been destroyed by the hyperparasite	1
Egg masses in which no indication of the actual or former presence of the primary parasite was found	2
Egg masses in which no primaries were found but in which eggs had been destroyed by some other cause (desiccation?)	1